1. A method for forming a sensor comprising the steps of:

providing a base wafer;

forming a sensor cavity in said base wafer;

coupling a diaphragm wafer to said base wafer, said diaphragm wafer including a diaphragm portion and a sacrificial portion, and wherein said diaphragm wafer is coupled to said base wafer such said diaphragm portion generally covers said sensor cavity;

reducing the thickness of said diaphragm wafer by removing said sacrificial portion; and

forming or locating at least one piezo resistive portion on said diaphragm portion.

2. The method of claim 1 wherein said diaphragm wafer is a silicon-on-insulator wafer including upper and lower silicon layers separated by an insulating layer, and wherein said upper silicon layer includes said sacrificial portion and said lower silicon layer includes said diaphragm portion, and wherein said reducing step includes removing at least said upper silicon layer of said diaphragm wafer.

3. The method of claim 1 wherein said coupling step includes coupling said diaphragm wafer to said base wafer by fusion silicon bonding.

4. The method of claim 1 further comprising the step of reducing the thickness of said base wafer.

5. The method of claim 4 wherein said base wafer is a silicon-on-insulator wafer including upper and lower silicon layers separated by an insulating layer, and wherein said reducing step of said base wafer includes removing said lower silicon layer of said base wafer.

6. The method of claim 1 wherein said base wafer and said diaphragm wafer are both silicon-on-insulator wafers.

7. The method of claim 1 wherein said forming or locating step includes bombarding at least a portion of said diaphragm wafer with high energy atoms using implantation methods.

8. The method of claim 1 further comprising the step of depositing at least two conductive leads on said diaphragm wafer, said leads being electrically coupled to said at least one piezo resistive portion.

9. The method of claim 8 further comprising the step of etching at least two grooves in said base wafer to form a surface for receiving an external wire therein, and wherein depositing step includes depositing said leads such that at least part of each lead is located in one of said grooves.

10. The method of claim 1 wherein said sensor cavity is generally circular in top view.

11. The method of claim 1 wherein said first forming step includes etching said sensor cavity using deep reactive ion etching.

12. The method of claim 1 further comprising the step of coupling a carrier wafer to said diaphragm wafer, etching a dicing lane around said sensor to release said sensor from said base wafer and diaphragm wafer, and removing said carrier wafer.

13. The method of claim 12 wherein said coupling step including bonding said carrier wafer to said diaphragm wafer, said etching step including etching using deep reactive ion etching.

14. The method of claim 12 wherein said sensor includes a body portion including said diaphragm portion and said at least one piezo resistive portion, and wherein said sensor includes a frame extending around said body portion, and wherein said carrier wafer is coupled to said frame and not coupled to said body portion during said coupling step.

15. The method of claim 12 further comprising the step of, before said coupling step, depositing a layer of conductive material on said diaphragm wafer to form at least two leads electrically coupled to said piezo resistive portion, and wherein at least part of said conductive material forms a spacer located adjacent to an end of said diaphragm portion, and wherein said carrier wafer is located on top of said spacer during said coupling step.

16. The method of claim 1 further comprising the steps of etching a dicing lane in said diaphragm wafer and said base wafer to define a body portion having said sensor located thereon, a frame located around said body portion, and an arm extending between said frame and said body portion.

17. The method of claim 16 further comprising the step of separating said sensor from said diaphragm wafer by breaking said arm to separate the body portion from said frame.

18. The method of claim 16 wherein said etching includes deep reactive ion etching.

19. The method of claim 1 wherein said first forming step includes etching said sensor cavity and etching a trough in said base wafer using deep reactive ion etching, and wherein the method further includes the step of depositing or growing an insulating layer on said base wafer after said first forming step.

20. The method of claim 19 wherein said base wafer and said diaphragm wafers are both silicon-on-insulator wafers including upper and lower silicon layers separated by an insulating layer, and wherein the method further includes the step of removing said upper silicon layer and said insulating layer of said diaphragm wafer, and bombarding selected portions of said lower silicon layer of said diaphragm wafer with high energy atoms to form said at least one piezo resistive portion.

21. The method of claim 20 further comprising the steps of depositing a passivation layer on said diaphragm wafer, etching said passivation layer to expose at least part of said at least one piezo resistive portion, and depositing a conductive material on said diaphragm wafer such that at least part of said conductive material contacts said exposed part of said at least one piezo resistive portion.

22. The method of claim 21 further comprising the step of removing any portions of said diaphragm wafer located over said trough, and forming at least two grooves in said trough.

23. The method of claim 22 further comprising the step of depositing an auxiliary passivation layer on said diaphragm wafer coating said conductive material, etching said auxiliary passivation layer to at least partially expose said conductive material, and depositing an auxiliary layer of conductive material on said sensor such that said auxiliary layer of conductive material contacts said conductive material, and such that at least part of said auxiliary layer of conductive material is located in each of said grooves.

24. The method of claim 1 wherein said diaphragm wafer is coupled to said base wafer such that said sensor cavity is sealed between said diaphragm portion and said base wafer.

25. A method for forming a sensor comprising the steps of:

providing a base wafer;

etching a sensor cavity in said base wafer;

providing a silicon-on-insulator diaphragm wafer including upper and lower silicon layers separated by an insulating layer;

coupling said diaphragm wafer to said base wafer such that a diaphragm portion of said base wafer is located over said sensor cavity;

etching said base wafer to reduce the thickness of said base wafer;

removing at least said upper silicon layer of said diaphragm wafer to reduce the thickness of said base wafer and form a diaphragm portion; and

depositing at least one piezo resistor on said diaphragm portion.

26. A method for forming a sensor comprising the steps of:

providing a base wafer;

forming a sensor cavity in said base wafer;

coupling a diaphragm wafer to said base wafer such that a diaphragm portion of said diaphragm wafer is located over said sensor cavity;

reducing the thickness of said base wafer; and

forming or locating at least one piezo resistive portion on said diaphragm portion.

27. A method for forming a sensor comprising the steps of:

providing a silicon base wafer;

forming a sensor cavity in said base wafer;

coupling a silicon diaphragm wafer to said base wafer by fusion silicon bonding, said diaphragm wafer including a diaphragm portion, and wherein said diaphragm wafer is coupled to said base wafer such said diaphragm portion generally covers said sensor cavity; and

forming or locating at least one piezo resistive portion on said diaphragm portion.

28. A pressure sensor comprising:

a base portion including a silicon bonding surface, said base portion further including a sensor cavity;

a diaphragm portion having a silicon bonding surface and a single crystal silicon diaphragm;

a fusion silicon bonding area located between and coupling together said bonding surfaces of said diaphragm portion and base portion, wherein said diaphragm is located over said sensor cavity such that said diaphragm can flex and extend into said sensor cavity when exposed to varying pressures; and

at least one piezo resistor located on said diaphragm such that flexure of said diaphragm causes a change in resistance in said at least one piezo resistor.

29. The pressure sensor of claim 28 wherein each of said base portion and said diaphragm portion are primarily silicon.

30. The pressure sensor of claim 28 wherein said sensor cavity is generally circular in top view.

31. The pressure sensor of claim 28 said base portion and said diaphragm portion are each a portion of a silicon-on-insulator wafer.

32. The pressure sensor of claim 28 wherein said diaphragm includes an auxiliary piezo resistor located thereon, wherein one of said piezo resistors is located and aligned to sense strain of said diaphragm in a direction parallel the crystal plane orientation of said diaphragm, and wherein the other of said piezo resistors is located and aligned to sense strain of said diaphragm in a direction perpendicular to the crystal plane orientation of said diaphragm.

33. The pressure sensor of claim 32 wherein further comprising at least two conductive leads, each of said leads being coupled to one of said piezo resistors and also being connectable to signal conditioning circuitry.

34. The pressure sensor of claim 33 wherein one of said leads is coupled to a first end of one of said piezo resistors, the other of said leads is coupled to a first end of the other of said piezo resistors, and wherein said sensor includes a supplemental lead coupled to a second end of both of said piezo resistors.

35. The pressure sensor of claim 33 further comprising a pair of diodes, each diode being connected, in series, to one of said piezo resistors.

36. The pressure sensor of claim 35 wherein said diodes are arranged in opposite polarities, and wherein one of said leads is connected to both of said diodes, and wherein the other of said leads is connected to both of said piezo resistors on a side opposite of said diodes.

37. The pressure sensor of claim 36 wherein said diodes, leads, and piezo resistors are arranged such that a current in a first direction flows through said first piezo resistor and not said second piezo resistor, and that a current in a second direction flows through said second piezo resistor and not said first piezo resistor such that the resistance of said first and second piezo resistors can be separately measured.

38. The pressure sensor of claim 33 wherein said each lead includes a connection portion and an extension portion, each extension portion extending from said connection portion to one of said piezo resistors, and wherein said connection portion of each lead is thicker than the extension portion of the associated lead.

39. The pressure sensor of claim 38 wherein said base portion includes at least two grooves formed therein, and wherein each groove receives a connection portion of one of said leads therein.

40. The pressure sensor of claim 33 wherein said diaphragm is aligned such that the crystal plane orientation of said diaphragm forms an angle of about 45 degrees with said at least two leads.

41. The sensor of claim 33 wherein said leads are titanium.

42. The pressure sensor of claim 28 wherein said diaphragm is aligned such that the crystal plane orientation of said diaphragm forms an angle of about 45 degrees with an outer edge of said sensor.

43. The pressure sensor of claim 28 wherein said pressure sensor has a thickness of less than about 80 microns.

44. The pressure sensor of claim 28 wherein said at least one piezo resistor is elastic such that when a strain is applied to said piezo resistor in a first direction, the dimensions of said piezo resistor in a second direction perpendicular to said applied strain are changed in a manner that changes the resistivity of the piezo resistor in an appreciable manner.

45. The pressure sensor of claim 44 wherein said at least one piezo resistor is generally square in top view.

46. The pressure sensor of claim 45 wherein said at least one piezo resistor is less than about 5 microns thick.

47. A pressure sensor comprising:

a diaphragm portion made of a material and having a diaphragm that can flex when exposed to varying pressures;

at least one piezo resistor located on said diaphragm; and

a base portion made of said material and being directly coupled to said diaphragm such that there are no foreign bonding or coupling agents located between said base portion and said diaphragm portion, said base portion being coupled to said diaphragm portion such that a cavity is formed between said base portion and said diaphragm portion and said diaphragm is located over said cavity.

48. The sensor of claim 47 wherein said material is silicon and a fusion silicon bonding zone is located between said base portion and said diaphragm portion.

49. The sensor of claim 47 wherein said diaphragm is single crystal silicon.

50. The sensor of claim 47 further comprising at least two conductive leads, each lead being coupled to said at least one piezo resistor and being connectable to signal conditioning circuitry.

51. The sensor of claim 47 wherein said diaphragm portion is located on top of said base portion, and wherein said base portion includes a trough portion that is not covered by said diaphragm portion, and wherein at least part of each of said leads are located in said trough portion.

52. A pressure sensor comprising:

a sensor body having a sensor cavity formed therein and a diaphragm generally covering said sensor cavity such that said diaphragm can flex into said sensor cavity when said diaphragm is exposed to varying pressures; and

at least one piezo resistor located on said diaphragm, said at least one piezo resistor being elastic such that when a strain is applied to said piezo resistor in a first direction, the dimensions of said piezo resistor in a second direction perpendicular to said applied strain are changed in a manner that changes the resistivity of the piezo resistor in an appreciable manner.

53. The pressure sensor of claim 52 wherein said at least one piezo resistor is generally symmetrical, in top view, about two axis.

54. The pressure sensor of claim 52 wherein said at least one piezo resistor is generally rectangular and had a length-to-width ratio of less than three.

55. The pressure sensor of claim 52 wherein said at least one piezo resistor is less than about 5 microns thick.

56. The pressure sensor of claim 52 wherein said diaphragm is single crystal silicon, and wherein said sensor includes at least two conductive leads, each lead being coupled to opposite

ends of said at least one piezo resistor such that the resistivity of said at least one piezo resistor can be measured.

57. The sensor of claim 52 wherein said sensor is sufficiently elastic that when a strain is applied in a first direction said piezo resistor changes its dimensions in a second direction perpendicular to said applied strain in a manner that changes the resistivity of the piezo resistor in a manner that can be sensed and confirmed by instrumentation.

58. A sensor comprising:

a movable component; and

a piezo resistor located on the movable component, wherein the resistivity of said piezo resistor varies with the movement of said movable component such that the movement of said movable component can be determined by measuring the resistivity of the piezo resistor, and wherein said piezo resistor is elastic such that when a strain is applied to said piezo resistor in a first direction, the dimensions of said piezo resistor in a second direction perpendicular to said applied strain are changed in a manner that changes the resistivity of the piezo resistor in an appreciable manner.

59. The sensor of claim 58 wherein said sensor is a pressure sensor and said movable component is a single crystal silicon diaphragm, and wherein said piezo resistor is generally symmetrical about two axes.

60. The pressure sensor of claim 58 wherein said at least one piezo resistor is generally rectangular and had a length-to-width ratio of less than three, and has a thickness of less than five microns.

61. A method for operating a pressure sensor comprising the steps of:

providing a pressure sensor including a base portion including a silicon bonding surface, said base portion further including a sensor cavity, said sensor including a diaphragm

portion having a silicon bonding surface and a single crystal silicon diaphragm, said pressure sensor further including a fusion silicon bonding area located between and coupling together said bonding surfaces of said diaphragm portion and base portion, wherein said diaphragm is located over said sensor cavity, said sensor including at least one piezo resistor located on said diaphragm;

placing said pressure sensor in a fluid such that the pressure of said fluid causes diaphragm to flex and extend into said sensor cavity to thereby changes the resistance of said at least one piezo resistor.